OrFPGA: An Empirical Performance Tuning Tool for FPGA Designs, Phase I
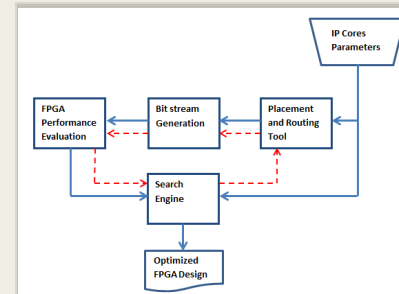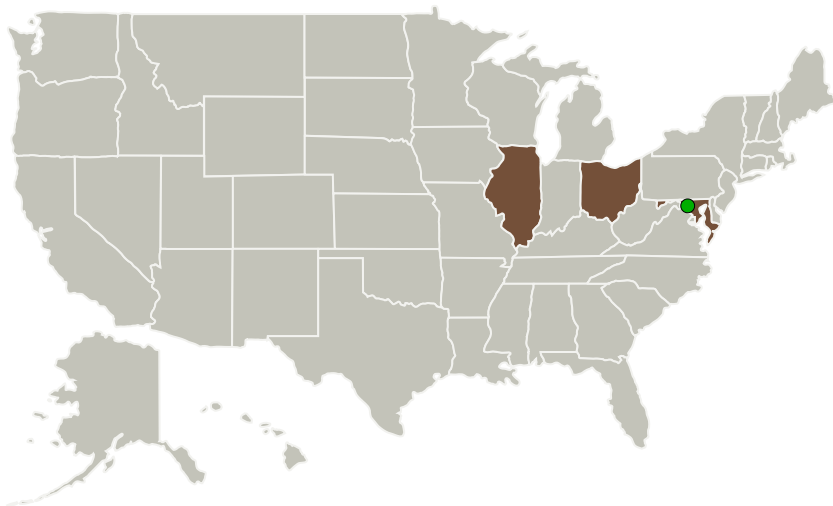
Completed Technology Project (2013 - 2014)

Project Introduction

With the capacity and performance of FPGAs suitable for space borne applications continuously increasing, the design of FPGAs is becoming increasingly complex involving trading off or simultaneous optimization of space, speed, and power. RNET and ANL are proposing to develop software infrastructure that facilitates automatic performance tuning of FPGAs in terms of speed, power, and size. We introduce an extensible empirical tuning tool system OrFPGA, which is aimed at improving both performance and productivity by enabling FPGA designers to create simple scripts that trigger various FPGA performance optimizations for a specific design. OrFPGA will generate various tuned versions of the same design with different designer parameters and evaluates the versions to select the best performing one for production use. The proposed work will leverage an existing performance tuning tool named Orio developed by ANL for empirical tuning of compute-intensive kernels for a given architecture.

Primary U.S. Work Locations and Key Partners

OrFPGA: An Empirical Performance Tuning Tool for FPGA Designs

Table of Contents

Organizations Performing Work	Role	Type	Location
RNET Technologies, Inc.	Lead Organization	Industry	Dayton, Ohio
Argonne National Laboratory(ANL)	Supporting Organization	R&D Center	Lemont, Illinois
●Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations	
Illinois	Maryland
Ohio	

Project Transitions

▶ **May 2013:** Project Start

✔ **May 2014:** Closed out

Closeout Documentation:
- Final Summary Chart(*https://techport.nasa.gov/file/140471*)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

RNET Technologies, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

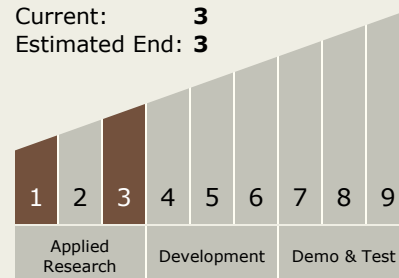**Program Director:**

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Chekuri S Choudary

Technology Maturity (TRL)

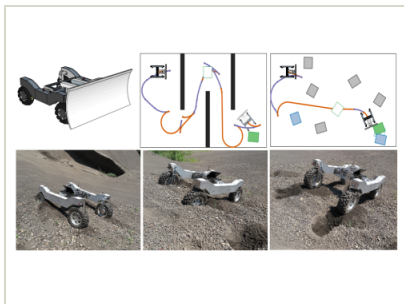Start: **1**
Current: **3**
Estimated End: **3**

1	2	3	4	5	6	7	8	9
Applied Research			Development			Demo & Test		

TechPort

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For more information and an accessible alternative, please visit:
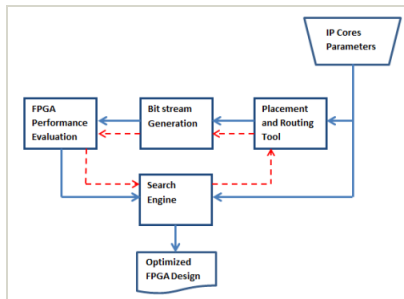https://techport.nasa.gov/view/18358

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Images

Final Summary Chart Image
OrFPGA: An Empirical Performance Tuning Tool for FPGA Designs, Phase I Project Image
(https://techport.nasa.gov/image/132697)

Project Image
OrFPGA: An Empirical Performance Tuning Tool for FPGA Designs
(https://techport.nasa.gov/image/131828)

Technology Areas

Primary:

- TX02 Flight Computing and Avionics
  └ TX02.1 Avionics Component Technologies
    └ TX02.1.5 High Performance Field Programmable Gate Arrays

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System